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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/754,172	01/09/2004	Stephan Dobritz	2003 P 50104 US	8452
48154	7590	06/30/2005	EXAMINER	
SLATER & MATSIL LLP 17950 PRESTON ROAD SUITE 1000 DALLAS, TX 75252			TANG, MINH NHUT	
			ART UNIT	PAPER NUMBER
			2829	

DATE MAILED: 06/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No. 10/754,172	Applicant(s) DOBRTZ ET AL.	
	Examiner Minh N. Tang	Art Unit 2829	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on amendment filed on April 25, 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-17 and 19-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-17 and 19-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01/09/20004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The indicated allowability of claims 1-2, 4-17 and 19-22 is withdrawn in view of the newly discovered reference(s) to Hidekatsu (JP 10-197557) and Farnworth et al. (U.S.P. 5,559,444). Rejections based on the newly cited reference(s) follow.

Claim Objections

2. Claims 1, 5, 6 and 21 are objected to because of the following informalities:

a/ in claim 1, line 12, "can be" should be -- is --.

b/ in claim 5, the dependency of the claim is improper, claim 5 should depend upon claim 1.

c/ in claim 6, since "the re-distribution layer" refers to "a re-distribution layer" recited in claim 5, therefore claim 6 should depend upon claim 5.

d/ in claim 21, "a die" (line 10), and "can be" (line 11) should be -- the die --, and -- is --, respectively.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

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were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-2, 4-17 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farnworth (U.S.P. 5,982,185) in view of Farnworth et al. (U.S.P. 6,329,829) and Hidekatsu (JP 10-197557).

As to claim 1, Farnworth discloses, in Figs. 1 and 8, a carrier (10, Fig. 1), wherein the carrier (10) comprises: a support structure (16MB); first contacts (44MB) disposed on the support structure (16MB) and arranged in a pattern; bumps (42MB) provided on the support structure (16MB); second contacts (60MB) formed on the bumps (42MB), wherein the second contacts (60MB) are electrically connected to the first contacts (44MB); and at least one opening (48I, Fig. 1) in the support structure (16MB) wherein a die (12) placed on the support structure (16MB) is drawn against the bumps (42MB) by a force generated by a vacuum and applied through the opening (48I). Farnworth does not disclose the bumps are made of elastomer and the electrical connection of the first contacts to the second contacts is established by conductor tracks rising on the elastomer bumps in a spiral or arcuate manner to a tip of the elastomer bumps. Farnworth et al. disclose, in Fig. 4A, elastomeric contacts (18) used to establish temporary electrical connections with flat contact locations (24) on a semiconductor component. It would have been obvious for one of ordinary skill in the art at the time the

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invention was made to modify the carrier of Farnworth by providing elastomeric material to the bumps as taught by Farnworth et al. so that by using elastomers, the elastomeric contacts are naturally resilient to provide compliancy characteristics and help to prevent excessive contact forces from damaging the contact locations on the component.

Hidekatsu discloses, in Figs. 1(a)-1(c), a contact structure comprising bumps (13), and electrical connection of a first contacts (lower 15) to a second contacts (upper 15) is established by conductor tracks (middle 15) rising on the bumps (13) in a spiral or arcuate manner to a tip of the bumps (13). It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the carrier of Farnworth by providing the connection between the first contacts to the second contacts in a form of conductor tracks rising on the bumps in a spiral or arcuate manner as taught by Hidekatsu in order to take a positive electric flowing, a good contact when the bumps are pressed against an inspected object.

As to claims 2 and 17, Farnworth discloses in Fig. 1 and 8, the second contacts (60MB) are comprised of gold.

As to claims 4 and 19, Hidekatsu discloses in Figs. 1(a)-1(c), the conductor tracks (15) comprise a copper-nickel-gold layer construction.

As to claims 5-6 and 20, Farnworth discloses in Figs. 1 and 8, a gold-gold contact is realized between the die (12) and the carrier (10) by a re-distribution layer (see, for example Fig. 4) arranged on the die (12), and wherein the re-distribution layer comprises a copper-nickel-gold layer construction.

As to claims 7 and 11, Farnworth in view of Farnworth et al. disclose the fixing of the die (12) takes place by a cover (18), wherein the cover (18) compresses the elastomer bumps (42MB) with a predetermined pressing force after placing.

As to claims 8 and 13, Farnworth discloses in Fig. 1, the cover (18) is formed as a spring element.

As to claims 9 and 15-16, Farnworth discloses, in Figs. 1 and 8, a method of processing a semiconductor die (12), the method comprising: providing a semiconductor die (12), the die (12) including contacts (50) formed in a pattern; providing a carrier (10), the carrier (10) comprising first contacts (44MB) disposed over a surface of a support structure (16MB), bumps (42MB) provided on the first contacts (44MB), and second contacts (60MB) formed on the bumps (42MB), wherein the second contacts (60MB) are arranged in a pattern corresponding to the pattern on the die (12), the second contacts (60MB) being electrically coupled to the first contacts (44MB); placing the die (12) on the support structure (16MB) of the carrier (10); securing the contacts (50) of the die (12) against the bumps (42MB) by a predetermined force generated by a vacuum (see column 3, lines 35-45); and evaluating (i.e., full functionality testing and burn-in testing) the semiconductor die (12). Farnworth does not disclose the bumps are made of elastomer and the electrical connection of the first contacts to the second contacts is established by conductor tracks rising on the elastomer bumps in a spiral or arcuate manner to a tip of the elastomer bumps. Farnworth et al. disclose, in Fig. 4A, elastomeric contacts (18) used to establish temporary electrical connections with flat contact locations (24) on a semiconductor

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component. It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the carrier of Farnworth by providing elastomeric material to the bumps as taught by Farnworth et al. so that by using elastomers, the elastomeric contacts are naturally resilient to provide compliancy characteristics and help to prevent excessive contact forces from damaging the contact locations on the component.

Hidekatsu discloses, in Figs. 1(a)-1(c), a contact structure comprising bumps (13), and electrical connection of a first contacts (lower 15) to a second contacts (upper 15) is established by conductor tracks (middle 15) rising on the bumps (13) in a spiral or arcuate manner to a tip of the bumps (13). It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the carrier of Farnworth by providing the connection between the first contacts to the second contacts in a form of conductor tracks rising on the bumps in a spiral or arcuate manner as taught by Hidekatsu in order to take a positive electric flowing, a good contact when the bumps are pressed against an inspected object.

As to claim 10, Farnworth discloses in Figs. 1 and 8, the die (12) is secured by a vacuum until the contacts (50) of the die (12) are fixed against the elastomer bumps (42MB).

As claim 12, Farnworth discloses in Figs. 1 and 8, the pressing force is approximately 2 to 8 grams per elastomer bump (42MB).

As to claim 14, Farnworth discloses in Figs. 1 and 8, providing a semiconductor die (12) comprises: fabricating a wafer (not shown) that includes a plurality of

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semiconductor dies (12); and separating the wafer to provide the semiconductor die (12).

6. Claims 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farnworth et al. (U.S.P. 5,559,444) in view of Farnworth et al. (U.S.P. 6,329,829) and Farnworth (U.S.P. 5,982,185).

As to claim 21, Farnworth et al. ('444) discloses, in Figs. 1, 2 and 5, a carrier (10) comprising a support structure (12); a frame (14) fastened on the support structure (12) and including four walls (56, Figs. 1B, 5B) to surround a surface (i.e., upper surface) of the support structure (12) of a size that corresponds to a size of a semiconductor die (18), and upper portion of the walls (56) being beveled in a direction toward the surface (see Fig. 5B and column 6, lines 21-23); first contacts (40, Fig. 2) disposed on the surface of the support structure (12); bumps (26) disposed on the surface (upper surface) of the support structure (12); second contacts (34, Fig. 2) formed on the bumps (26), wherein the second contacts (34) are electrically connected to the first contacts (40). Farnworth et al. does not disclose the bumps are made of elastomer and at least one opening in the support structure wherein the die placed on the support structure is drawn against the bumps by a force generated by a vacuum and applied through the opening. Farnworth et al. ('829) disclose, in Fig. 4A, elastomeric contacts (18) used to establish temporary electrical connections with flat contact locations (24) on a semiconductor component. It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the carrier of Farnworth et al. ('444) by providing elastomeric material to the bumps as taught by Farnworth et al. ('829) so that

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by using elastomers, the elastomeric contacts are naturally resilient to provide compliancy characteristics and help to prevent excessive contact forces from damaging the contact locations on the component. Farnworth ('185) discloses, in Figs. 1 and 8, at least one opening (48I, Fig. 1) in the support structure (16MB) wherein a die (12) placed on the support structure (16MB) is drawn against the bumps (42MB) by a force generated by a vacuum and applied through the opening (48I). It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the carrier of Farnworth et al. ('444) by providing at least one opening in the support structure for applying a vacuum through the opening as taught by Farnworth ('185) for holding and manipulating the die using a vacuum force during assembly and disassembly of the carrier.

As to claim 22, Farnworth et al. ('444) does not show a cover overlying the support structure, wherein the cover is formed as a spring element. Farnworth ('185) discloses in Fig. 1, a cover (18) overlying the support structure (12), wherein the cover (18) is formed as a spring element. It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the carrier of Farnworth et al. ('444) by providing a cover as a spring element as taught by Farnworth ('185) in order to secure the die to the support structure.

Communication

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Minh N. Tang whose telephone number is (571) 272-1971. The examiner can normally be reached on M-F (7:00-3:30).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nestor R. Ramirez can be reached on (571) 272-2034. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



MINH NHUT TANG
PRIMARY EXAMINER

6/22/05